

Docket No. 520.42915X00
Serial No. 10/613,148
Office Action dated June 28, 2005

REMARKS

I. Introduction

By the present Amendment, claims 1-3 and 5 have been amended. No claims have been added or canceled. Accordingly, claims 1-15 remain pending in the application. Claims 1, 3, and 11 are independent.

II. Office Action Summary

In the Office Action of June 28, 2005, claims 11-15 were rejected under 35 USC §101. Claims 2 and 5 were rejected under 35 USC §112, second paragraph. Claims 1-5 and 10 were rejected under 35 USC §102(b) as being anticipated by either U.S. Patent No. 4,482,810 issued to Cook or U.S. Patent No. 6,271,852 issued to Kamiyama et al. ("Kamiyama"). These rejections are respectfully traversed.

The Examiner's indication that claims 6-9 are allowable, is noted with appreciation.

III. Rejections Under 35 USC §101

Claims 11-15 were rejected under 35 USC §101 as being directed to non-statutory subject matter. In support of this rejection, the Office Action indicates that the claims are directed to a method that does not require computer implementation or use of technology to accomplish. Furthermore, the Office Action indicates that the claims allow for the involvement of subjective human decision and therefore do not necessarily produce repeatable, concrete results.

Applicants respectfully disagree with the allegations made in the Office Action. Independent claim 11, as amended, is directed to an exposure method in which a charged particle beam or light is applied on a sample, while the application thereof is

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controlled using pattern shape data in a bitmap format. As discussed in the present Specification, the exposure method can be used in lithography systems for exposing Large Scale Integration (LSI) patterns. Page 1, lines 5-19.

Applicants therefore respectfully submit that claims 11-15 satisfy the requirements of 35 USC §101 because they are, in fact, directed to statutory subject matter and utilize computer implementation of machinery in order to achieve a useful result. Accordingly, withdrawal of this rejection is requested.

Applicants further submit that claims 11-15 are allowable since there are no rejections based on the art of record.

IV. Rejections Under 35 USC §112

Claims 2 and 5 were rejected under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention. With regards to this rejection, the Office Action cites several instances of indefiniteness in the pending claims.

By the present Amendment, Applicants have amended the pending claims, in part, to address all instances of indefiniteness cited in the Office Action.

It is therefore respectfully submitted that the presently pending claims satisfy the requirements of 35 USC §112, second paragraph. Accordingly, withdrawal of this rejection is respectfully requested.

V. Rejections Under 35 USC §102

Claims 1-5 and 10 were rejected under 35 USC §102(b) as being anticipated by either Cook or Kamiyama. With respect to this rejection, the Office Action indicates that all of the features recited in the pending claims are disclosed by Cook. Reference is directed to column 3, line 25 to column 4, line 2; column 7, line 67 to

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column 8, line 12; and claims 1-6. With respect to Kamiyama reference is directed to Figs. 30A and 30B, and column 3, line 35 to column 5, line 17.

As amended, independent claim 1 defines an exposure apparatus that comprises, in part:

... a data processing means for bitmapping the shape of the pattern, and generating the pattern shape data in the bitmap format; and a means for controlling the application of the charged beam or light onto the sample using the pattern shape data in the bitmap format; wherein the data processing means comprises a function of rasterizing a pattern vertex data defining the pattern shape by a unit of a respective row area of the bitmap, a function of rejecting an overlap area between patterns, and a function of generating the pattern shape data in the bitmap format by the unit of a respective row area of the bitmap in a parallel pipeline manner, based on the result of the overlap rejection function.

According to Independent claim 1, the exposure apparatus includes a data processing means for bitmapping the shape of the pattern and generating the pattern shape data in the bitmap format. The data processing means includes a function for rasterizing a pattern vertex data that defines the pattern shape by a unit of the respective row area of the bitmap. The data processing means also includes a function for rejecting overlap area between the patterns, and a function for generating the pattern shape data in the bitmap format. Additionally, the pattern shape data is generated by the unit of the respective row areas of the bitmap in a parallel pipeline manner. According to such a feature, various calculations are performed in parallel, thereby allowing the bitmap data for each row to be calculated sequentially. As the bitmap data for each row is calculated, the exposure data for each line can also be sequentially produced. See Fig. 2. According to such a feature, it is not necessary to store the entire bitmap data in memory. Rather, the exposure data can be produced as the bitmap data is being processed. This can, for example, increase the processing speed and reduce the size of the apparatus. See page 10, line 9 to page 11, line 20.

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The Office Action alleges that Cook and Kamiyama disclose the features recited in the claimed invention. This is not the case, however. Review of the passages cited in the Office Action has not provided any disclosure or suggestion for the features recited in independent claim 1. For example, Cook provides no disclosure or suggestion for applying pattern vertex data to define the pattern shapes. Rather, Cook utilizes a system wherein an initial point is used in conjunction with the length of the pattern in the x and y directions. See Figs. 6A to 8A. Furthermore, the patterns produced by Cook are not computed in a parallel pipeline manner, as set forth in independent claim 1. Rather, Cook appears to compute the pattern data and store the pattern data in memory, as with conventional methodologies.

Likewise, Kamiyama does not apply pattern vertex data to define the pattern shapes. Kamiyama also provides no disclosure or suggestion for computing the pattern shape data in a parallel pipeline manner as set forth in independent claim 1. Cook and Kamiyama clearly fail to disclose various features recited in independent claim 1 such as, for example, "a function of rasterizing a pattern vertex data defining the pattern shape by a unit of a respective row area of the bitmapping a function of rejecting an overlap area between patterns and a function of generating the pattern shape data in the bitmap parallel pipeline manner".

It is therefore respectfully submitted that independent claim 1 is allowable over the art of record.

Claim 2 depends from claim 1, and is therefore believed allowable for at least the reasons set forth above with respect to independent claim 1. In addition, claim 2 introduces novel elements that independently renders it patentable over the applied references. For example, claim 2 allows the pattern shapes to be expressed by a pair of opposite corner point coordinates of each line parallel to any one coordinate

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axis of orthogonal coordinates defined on the sample. Neither Cook nor Kamiyama utilize a pair of opposite corner point coordinates in defining the pattern shapes.

As amended, independent claim 3 defines an exposure apparatus that comprises:

a means for applying a charged particle beam or a light onto a sample, and exposing a desired pattern onto the sample; a data processing means for bitmapping the shape of the pattern, and generating the pattern shape data in the bitmap format; and a means for controlling the application of the charged particle beam or light onto the sample using the pattern shape data in the bitmap format; wherein the data processing means comprises a function of decomposing the pattern shape into a plurality of rectangle patterns parallel to any one coordinate axis of orthogonal coordinates defined on the sample, converting the pattern shape into a data format for expressing the pattern shape as a pair of opposite corner point coordinates of each line parallel to any one coordinate axis of the orthogonal coordinates defined on the sample, a function of rejecting an overlap area between patterns from the respective sorted corner point data, and a function of generating the pattern shape data in the bitmap format by a unit of one of the plurality of rectangle patterns in a parallel pipeline manner, based on the result of the overlap rejection function.

According to independent claim 3, the exposure apparatus includes a data processing means for bitmapping the shape of the pattern, and generating the pattern shape data in the bitmap format. Furthermore, the data processing means converts the pattern shape data into a data format that expresses the pattern shape as a pair of opposite corner point coordinates of each line parallel to any one coordinate axis of the orthogonal coordinates defined on the sample. The data processing means also includes a function for generating the pattern shape data in a parallel pipeline manner. As previously discussed, such features are simply not disclosed or suggested by the applied references.

It is therefore respectfully submitted that independent claim 3 is allowable over the art of record.

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Claims 4, 5, and 10 depend from independent claim 3, and are therefore believed allowable for at least the reasons set forth above with respect to independent claim 3. In addition, these claims each introduce novel elements that independently render them patentable over the art of record.

VI. Conclusion

For the reasons stated above, it is respectfully submitted that all of the pending claims are now in condition for allowance. Therefore, the issuance of a Notice of Allowance is believed in order, and courteously solicited.

If the Examiner believes that there are any matters which can be resolved by way of either a personal or telephone interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

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AUTHORIZATION

Applicants request any shortage or excess in fees in connection with the filing of this paper, including extension of time fees, and for which no other form of payment is offered, be charged or credited to Deposit Account No. 01-2135 (Case: 520.42915X00).

Respectfully submitted,
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